

Abstract

The present circuit is for a resonant, regenerative switching piezomotor drive amplifier that efficiently converts electrical energy into mechanical work through a piezoelectric actuator. The actuator driver of the present invention drives the real work-producing part of the system load over a broad range of frequencies from DC to several kHz, dramatically increasing the system power efficiency and full power bandwidth. The gains in efficiency are obtained by operating the motor/amplifier system at both electrical and mechanical resonances for the system. The amplifier's efficiency is greater than 80% when driving a 1 μ F piezoelectric load with a 500 V peak-to-peak signal. The available output power is greater than 20 watts continuously from DC to 2.0 kHz.

The resonant, switching regenerative piezomotor drive amplifier described herein not only drives high voltage piezoelectric actuators, but will also serve equally well in any application that requires high power drive signals to be applied to a predominantly capacitive load.